

**CLAIMS**

1. A method of determining the consumption of oil coming from the oil separation system (2) located in the circuit for recycling the blowby gases of an internal combustion engine, characterized in that:
  - the lubricating oil for said engine is labeled by introducing at least one radioactive tracer into said oil;
  - the blowby gases, leaving the engine block (1) and laden with lubricating oil, are made to pass through an oil separation system (2) where at least some of the oil contained within said gases is separated, collected and returned to the oil sump (6);
  - the oil not separated from the blowby gases coming from the oil separation system (2) is trapped in an oil trapping device (4) located downstream of said oil separation system (2);
  - the radioactivity of the oil not separated in the oil separation system (2) and retained in the oil trapping device (4) is measured using a detector (3), which is placed near the oil trapping device (4) and is sensitive to the ionizing radiation emitted by the radioactive tracer(s); and
  - the results of these measurements are sent to a computer (5) capable of calculating the consumption of lubricating oil not separated in said separation system (2) from these results.
2. The method as claimed in claim 1, characterized in that the oil separation system (2) consists of several separators connected in series or in parallel.
3. The method as claimed in either of the preceding

claims, characterized in that the blowby gases coming from the trapping device (4) are released into the atmosphere or sent to the intake (D) of the engine.

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4. The method as claimed in any one of the preceding claims, characterized in that the oil trapping device (4) is a second separation system comprising one or more static separation elements and/or one or more cyclones and/or one or more filtering elements.
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5. The method as claimed in any one of the preceding claims, characterized in that the oil trapping device (4) is designed so that the pressure difference ( $\Delta P$ ) between the inlet of the oil separation system (2) and the outlet of the oil separation system (2) is substantially the same as the value of this pressure difference in the absence of the trapping device.
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6. The method as claimed in any one of the preceding claims, characterized in that the radioactive tracer is an organic or mineral compound of a radioactive element.
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7. The method as claimed in one of the preceding claims, characterized in that the radioactive element has a period, or half-life, of less than 3 years, preferably less than 1 year and in particular less than 30 days.
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8. The method as claimed in claim 7, characterized in that the radioactive element is chosen from  $^{22}\text{Na}$ ,  $^{65}\text{Zn}$ ,  $^{45}\text{Ca}$ ,  $^{35}\text{S}$ ,  $^{32}\text{P}$ ,  $^{47}\text{Ca}$ ,  $^{99}\text{Mo}$ ,  $^{82}\text{Br}$ ,  $^{64}\text{Cu}$ ,  $^{99\text{m}}\text{Tc}$ ,  $^{28}\text{Mg}$ ,  $^{68}\text{Ge}$ ,  $^{69}\text{Ge}$ ,  $^{77}\text{Ge}$ ,  $^{85}\text{Sr}$  and  $^{56}\text{Co}$ .
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9. The method as claimed in claim 8, characterized in that the radio tracer is chosen from tetra-

alkylgermanes containing  $^{69}\text{Ge}$ , preferably from tetrahexylgermane, tetraheptylgermane and tetraoctylgermane, or a mixture thereof.

- 5 10. The method as claimed in claim 8, characterized in that the radio tracer is  $^{99\text{m}}\text{Tc}$ , preferably in the form of an aqueous solution of sodium pertechnetate  $\text{NaTcO}_4$  or in the form of nanoscale particles isolated from the atmosphere by carbon.
- 10 11. The method as claimed in any one of the preceding claims, characterized in that the detector is an ionizing radiation detection probe.
- 15 12. A device for determining the consumption of oil coming from the oil separation system (2) located in the circuit for recycling the blowby gases of an internal combustion engine, characterized in that it comprises:
- 20 • an internal combustion engine lubricated by an oil labeled by introducing at least one radioactive tracer into said oil;
- an oil separation system (2) that receives the blowby gases laden with lubricating oil leaving
- 25 the engine block (1), where at least some of the oil contained in said blowby gases is separated, collected and returned to the oil sump;
- downstream of the oil separation system (2), an oil trapping device (4);
- 30 • a detector (3) sensitive to the ionizing radiation emitted by the radioactive tracer(s), located in the immediate vicinity of the trapping device (4), so as to measure the radioactivity of the oil not separated in the oil separation system
- 35 (2) but retained in the oil trapping device (4); and
- connected to said detector (3), a computer (5) programmed for calculating the consumption of lubricating oil not separated in said separation

system (2) from the results of the radioactivity measurements.

13. The device as claimed in claim 12, characterized  
5 in that the oil trapping device (4) is designed in  
such a way that the pressure difference ( $\Delta P$ )  
between the inlet and the outlet of the oil  
separation system (2) is approximately the same as  
the value of this pressure difference in the  
10 absence of said oil trapping device.